WHAT IS CLAIMED IS:

1.   A surface plasmon resonance sensor comprising:

     a prism having a surface on which a metallic layer is coated;

     a metallic nanoparticle layer formed on the metallic layer;

     a light source giving off a light to the prism, the light being reflected by the
         surface of the prism to form a reflected light; and

     a light detector for detecting the reflected light.

2.   The surface plasmon resonance sensor according to claim 1 further comprising a
     dielectric layer coated on the metallic nanoparticle layer.

3.   The surface plasmon resonance sensor according to claim 1, wherein the light
     source comprises a semiconductor laser array for radiating multiple laser beams,
     a polarizing device and a half-wave plate for adjusting polarized components of
     the laser beams.

4.   The surface plasmon resonance sensor according to claim 1 further comprising a
     spectral prism for splitting the reflected light into polarized transverse magnetic
     light wave and transverse electric light wave.

5.   The surface plasmon resonance sensor according to claim 1, wherein the metallic
     layer comprises gold.

6.   The surface plasmon resonance sensor according to claim 1, wherein the metallic
     layer comprises silver.

7.   The surface plasmon resonance sensor according to claim 1, wherein the metallic
     layer has a thickness of approximately 50 nm.

8.   The surface plasmon resonance sensor according to claim 1, wherein the metallic
     nanoparticle layer comprises at least nanometer order grains selected from a
     group consisting of gold, silver and platinum.

9.   The surface plasmon resonance sensor according to claim 1, wherein the metallic
     nanoparticle layer comprises nanoparticle having a diameter of approximately
     1-50 nm.

10. The surface plasmon resonance sensor according to claim **1**, wherein the metallic nanoparticle layer has a thickness of approximately 1-50 nm.

11. The surface plasmon resonance sensor according to claim **1**, wherein the metallic nanoparticle layer is formed by means of co-sputtering.

12. The surface plasmon resonance sensor according to claim **8**, wherein the metallic nanoparticle layer comprises a material selected form a group consisting of polymethyl methacrylate (PMMA) and silicon oxide.

13. The surface plasmon resonance sensor according to claim **1** further comprising a self assembled monolayer adjacent the metallic nanoparticle layer.

14. The surface plasmon resonance sensor according to claim **13**, wherein the self-assembled monolayer comprises at least one of functional groups and molecule selected from a group consisting of SH, NH_2, CHO, COOH, and Biotin.

15. A method for detecting properties of substance by using a surface plasmon resonance sensor, the method comprising the following steps:
    (a) preparing a surface plasmon resonance sensor comprising a prism having a surface on which a metallic layer is coated, a metallic nanoparticle layer formed on the metallic layer, a light source giving off a light to the prism, the light being reflected by the surface of the prism to form a reflected light and a light detector for detecting the reflected light;
    (b) preparing a self-assembled monolayer on surface of the metallic nanoparticle layer of the surface plasmon resonance sensor;
    (c) preparing a sensing layer immobilized onto the self assembled monolayer for reacting with said; and
    (d) contacting said substance with the sensing layer.

16. A method for detecting properties of substance by using the surface plasmon resonance sensor, the method comprising the following steps:
    (a) preparing a surface plasmon resonance sensor comprising a prism having a surface on which a metallic layer is coated, a metallic nanoparticle layer formed on the metallic layer, a light source comprising a semiconductor

laser array for radiating multiple laser beams, a polarizing device and a half-wave plate for adjusting polarized components of the laser beams, and light detector for detecting a reflected light formed by reflecting the laser beams by the surface of the prism;

(b) preparing a self-assembled monolayer on surface of the metallic nanoparticle layer of the surface plasmon resonance sensor;

(c) preparing a sensing layer immobilized onto .the self assembled monolayer for reacting with said; and

(d) contacting said substance with the sensing layer.

17. A method for detecting properties of substance by using the surface plasmon resonance sensor, the method comprising the following steps:

(a) preparing a surface plasmon resonance sensor comprising a prism having a surface on which a metallic layer is coated, a metallic nanoparticle layer formed on the metallic layer, a light source giving off a light to the prism, the light being reflected by the surface of the prism to form a reflected light, a spectral prism for splitting the reflected light into polarized transverse magnetic light and transverse electric light wave and a light detector for detecting the polarized waves;

(b) preparing a self-assembled monolayer on surface of the metallic nanoparticle layer of the surface plasmon resonance sensor;

(c) preparing a sensing layer immobilized onto the self assembled monolayer for reacting with said; and

(d) contacting said substance with the sensing layer.